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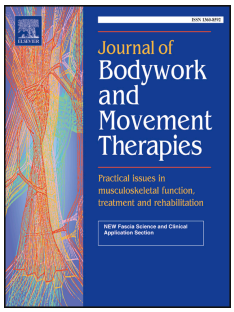

A randomised crossover trial comparing Thai and Swedish massage for fatigue and depleted energy

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A randomised crossover trial comparing Thai and Swedish massage for fatigue and depleted energy

Journal of Bodywork and Movement Therapies

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SUMMARY

Background

The aim of this study was to compare the efficacy and social constructions of Thai massage (TM) and Swedish massage (SM) for patients experiencing fatigue or depleted energy.

Method

Twenty participants were randomised to receive three once-weekly TM treatments and three once-weekly SM treatments, with crossover after three massages. Symptom checklists were administered at three time points and included Activation-Deactivation Adjective Check List and VAS Scale. Qualitative data were collected through semi-structured interviews and participants' diary entries.

Results

Both massage types enhanced physical, emotional and mental wellbeing through improved sleep, relaxation, relief of stress and relief of muscular tension. TM alone showed specific energising and psychological stimulation results, along with carry-over effect and longer lasting benefits. Ninety-five percent of participants found relief from their initial reason presenting symptoms

Conclusion

TM or SM can relieve symptoms of fatigue or low energy by releasing stress, promoting relaxation, relieving muscular aches and pains and improving energy. SM results in a larger effect in relaxation and improved sleep whereas TM results in a larger effect in energising, rejuvenating and mentally stimulating effects.

Keywords: Complementary Therapies; Therapy, Soft Tissue; Massage; Cross-Over Studies

MAIN TEXT

Introduction

While fatigue can be a normal and appropriate physiological response to physical exertion or lack of sleep it is also associated with many medical conditions and can severely exacerbate the problems experienced by patients and/or hinder their recovery and rehabilitation. Both complementary and alternative medicine therapies such as Thai massage (TM), and more orthodox treatments, such as Swedish massage (SM), continue to enjoy huge and ever expanding popularity with the public for the treatment of physiological and psychological conditions including fatigue and/or pain. Research shows that massage therapy can effectively reduce fatigue in patients presenting with physical conditions, and provide beneficial psychological effects (Backus et al, 2016; Field, 2016)

TM purports to influence the body's energy system based on ancient metaphysical concepts which hold that the four elements (earth, water, wind and fire) of the *"life energy*" flows through hypothetical channels called *"sen"* lines and that ill health is due to energy blockages and/or imbalances. TM aims to influence the wind element, releasing it where it is stagnant, and employs rhythmic thumb, palm and elbow pressure, muscle compressions and stretching along these energy lines (Brust 1996; Chia & Chia 2005; Holey & Cook 2003). TM, unlike SM, which follows a more orthodox physiological model, focuses primarily on promoting and stimulating energy flow to release blockages on a physical, emotional and mental level, thereby supporting the body to health through holistic balance and harmony (Mercati 1998). In Western terms, TM can maintain health and wellbeing by combating common ailments, increasing the effectiveness of movement and

benefit the physiological and psychological systems (Chaithaouthi & Muangsiri 2007)

SM works principally on the physical body, namely the muscles and soft tissue. It typically facilitates physical, mental and emotional relaxation. The benefits cited for SM include reduction of muscle spasm, pain and tension, release of endorphins, relaxation, improved blood circulation and lymphatic drainage and a feeling of wellbeing (Holey & Cooke 1997). Massage techniques involve petrissage (kneading), effleurage (long strokes), friction and tapotement (chopping or hacking movements) to relax, stretch, stimulate, increase circulation and reduce adhesions in muscles and soft tissue (Weerapong & Kolt 2005)

Many published randomised studies comparing TM and SM relate to low back pain and show some evidence of effectiveness further studies. (Netchanok, Wendy & Marie, 2012). No research was available involving comparison of effectiveness of TM and SM for fatigue across multiple treatment sessions. One comparative study (Cowen et al. 2006) researched TM and SM by measuring physiological and psychological outcomes; although the purpose of this study was to compare the results of a single massage treatment, the resulting recommendations included future research involving repeated treatments over a longer time-period.

The case for research to enhance knowledge, enable the regulation of therapies and therapists, and allow the public and health professionals to make informed choices is clear. The aim of this study was therefore to compare both the efficacy

and social constructions of Thai versus SM in patients with fatigue and/or depleted energy.

Study Design

The study design was a mixed-methods exploratory prospective randomised crossover trial. Participants received three (45 minutes) once weekly TMs with three once weekly (45 minute) SMs. Self-reported fatigue and/or depleted energy in terms tiredness, pain and arousal states were collected. Participants' social constructions of the massage programmes and complementary therapies were elicited to explore and to compare their experiences.

Qualitative and quantitative data were collected at three time points: before randomisation (baseline), at cross-over point week four and one week after the six-week intervention period (week seven).

In blocks of four, participants were randomised to two treatment orders (2 x n = 2 x10 = 20 = N). Participants in Treatment Order 1 received three, once weekly, 45-minute SM sessions, followed by three, once weekly, 45-minute TM sessions. In Treatment Order 2, the order of massage types was reversed. Both whole-body Thai and whole-body SMs comprised massage of the back of the body (legs, back and shoulders) and the front (neck, face, arms, shoulders, legs and feet). All massage treatments were delivered by a qualified and insured TM and SM therapist with eight years' experience. The massage therapist trained in Thailand at the Old Medicine School in Northern Style Traditional TM; and in England in

Body Massage and Sports Massage. She is a member of the Federation of Holistic Therapists (FHT) and The Complementary and Natural Healthcare Council (CNHC).

Participants

Participants were recruited via an invitation e-mail sent to all staff over 18 years at a UK University with the following criteria. Inclusion criteria were: any staff member suffering from fatigue and/or depleted energy; persons in good command of the English language. Exclusion criteria were: anyone suffering from physical conditions contra-indicated for massage treatment, or not having the mental capacity to complete diary entries. (Although it cannot be guaranteed that the self-reported of symptoms at the start of the study was genuine, both the qualitative results and the quantitative results clearly demonstrate evidence for symptom relief. These results lend credibility to the genuine nature of the self-reported symptoms at the start of the study). Maximum study capacity was set at 20 participants. Within the space of a week, over 200 staff replied. All people received a phone call from the therapist to discuss motivation and commitment. Finally, 20 participants (Treatment Order 1; 7 female, 3 male, mean age 42.3 years, range 28-64, *SD* = 11.4; Treatment Order 2; 8 female, 2 male, mean age 37.6 years, range 25-59, *SD* = 10.9) were selected based on their ability to commit to the six-week study dates and their willingness to complete personal diary entries. All participants completed all outcome measures at all three time points bar, except for one male participant from Treatment Order 1 who did not complete the final

quantitative data collection and final TM due to work commitments. No incentives were offered for participation.

Procedures

Research ethics clearance was obtained and participants received a copy of a participant's information sheet via e-mail and those who chose to take part completed a Consent Form immediately before randomisation and baseline data collection. Data collection, interviews and massage treatments were conducted by one massage therapist to enable standardisation of treatment and to ensure the results of the treatments were not influenced by the participants' preference for one therapist over another. The setting was a quiet room in which the same relaxing music was played throughout all treatments to minimise any distraction by external noise. Participants were asked not to speak with the therapist during treatment as this may confound treatment outcomes through a participant's personal disclosure and stimulation of emotions (Field et al. 1992)

Whole body Northern Style TM was carried out, with participants fully-clothed, on a two-inch thick mattress in the prone, supine, side and sitting positions.

SM was performed with grapeseed oil in the prone and supine positions on a massage bed, with participants undressing and covering themselves with towels provided, and following the treatment re-dressing behind a screen. Both massages covered all areas of the body: feet, legs, hips, back, upper chest, arms, hands, neck and face.

A SM routine is generally carried out for 45 minutes to one hour. The minimum time for a TM is usually one and a half hours for the 'classic routine' (Salguero & Roylance 2011). In this crossover trial, both Thai and SM were performed for 45 minutes. Although the whole body was covered in this time, there may be increased benefit by performing the TM for one and a half hours. TM is a flexible therapy and is tailored to the client – a relaxing massage will incorporate slower, gentler movements whereas an energising massage would include deep stretching, faster speed and stronger pressure. The massage may be a general TM or therapeutic (concentrating on a particular issue). In this crossover trial the TM performed was of the general and energising type. SM can be tailored to the client's requirements, by varying the pressure, speed and movement type of the strokes used. In this study firm pressure and medium speed of strokes were used during SM; movements included effleurage (including reinforced i.e. hand on top of hand or hand on top of fingers), alternate thumb massage, petrissage (including using flat of knuckles), friction and tapotement

Materials and equipment

The Activation-Deactivation Adjective Check List (AD-ACL) (Thayer, 1989) was used to measure arousal. The AD-ACL is a 20-item multidimensional psychometric test of various arousal states, with 4 subscales – Energy (items: Active, Energetic, Vigorous, Lively, Full of pep), Tiredness (items: Sleepy, Tired, Drowsy, Wide-awake, Wakeful), Tension (items: Jittery, Intense, Fearful, Clutched up, Tense) and Calmness (items: Placid, Calm, At rest, Still, Quiet). Items use a 4-point Likert response format with response options Definitely yes, Slightly, Cannot decide and Definitely no. A desirable arousal state is indicated by high

levels of energy and calmness and low levels of tiredness and tension. An active arousal state is indicated by high levels of energy and tension and low levels of tiredness and calmness. For this study the total score was calculated and reported so that higher scores represented the more desirable states: higher total scores of desirable arousal occurred where participants reported high levels of Energy and Calmness, but low levels of Tiredness and Tension; higher total scores of active arousal occurred where participants reported high levels of Energy and Tension, but low levels of Tiredness and Calmness.

Specific for this study, two visual analogue scales measured tiredness and pain over the previous three days, which participants marked on one 100 mm-long line (converted into a score between 0 [no] and 10 [extreme]). Participants were asked to rate their generalised, overall experience of pain, without reference to a specific location, body area or type of pain.

Previous research has reported test-retest reliability for the AD-ACL subscales to be 0.89 for energy, 0.89 for tiredness, 0.93 for tension and 0.79 for calmness (Thayer, 1989). Moreover, factorial validity of the four primary scale components (energy, wakefulness, tension and calmness) and the two secondary scale components (energetic and tense arousal) has demonstrated (Koščec et al., 2001).

Participants reported their primary and secondary presenting symptoms and their previous experience of CAM and/or massage therapies on the Baseline Data Sheet. An interview guide was created to conduct semi-structured interviews at

the three time points: base-line before randomisation, cross-over and final, to explore participants' social constructions and experiences of TM and SM: A social construct: a concept or perception of a phenomenon based on collective views developed and maintained within a society or societal group as opposed to existing inherently or naturally (Oxford Dictionary). Participants were also asked to write a brief, free-text record in the study diary of how they had been feeling over the preceding 24 hours and to describe what and how many of any prescribed medicines, or alternative remedies they took during the study.

Methodology triangulation was used in this mixed-method trial in order to reduce bias, provide validity and verification, give enhanced insight into the subject, and to ensure comprehensiveness of data. This included interviews, diaries and validated quantitative data collection via psychological scales (Thrumond 2001). Participants were randomized after all baseline data had been collected and before treatment commenced. Only the clinician (masseuse) was aware of which participant was allocated to which arm and what the codes of the randomisation sequence represented. In studies with interventions of this type it is impossible for the clinician delivering the intervention (massages) to be blind. The collection of interview data and conducting the data analysis were all undertaken blind.

Data Analysis

AD-ACL subscales were analysed for internal-consistency reliability with Cronbach's alpha. Magnitude-based inference was used in all subsequent analysis. Magnitude-based inference offers a theoretically justified and practically

useful approach in any behavioural research that involves statistical inference (van Schaik & Weston, 2016). The approach uses the smallest important effect in making an inference: a clear effect is never an artefact of sample size, which happens in null-hypothesis testing when the hypothesis no effect is tested. The spreadsheets with detailed results are presented as online supplementary materials (adapted from Hopkins, 2007). Outcomes of positivity, triviality and negativity are quantified with probabilities and matching qualitative descriptors, providing a rich type of inference. For interpretation of the obtained probabilities, the following qualitative probabilistic terms are applied: [0; 0.005>: most unlikely, almost certainly not; <0.005; 0.05]: very unlikely; <0.05; 0.25], unlikely, probably not; <0.25; 0.75]: possibly; <0.75; 0.95], likely, probably; <0.95; 0.995]: very likely; <0.995; 1]: most likely, almost certainly (Batterham & Hopkins, 2006).

For quantitative analysis, descriptive statistics were produced with SPSS. Inferential statistics (t-tests) were run into SPSS and the results were then entered as input for spreadsheets to produce results of magnitude-based inference (Hopkins, 2007). Unrelated t-tests were conducted regarding the smallest important effect size, as defined by the research team: In magnitude-based inference, results are presented for a small effect as the threshold for the smallest important beneficial or positive effect (d = 0.2 in t tests) and for the smallest harmful or negative effect (d = -0.2) (Hopkins, 2010). These were used to analyse a difference between the two treatment orders on (i) outcome measures at baseline, (ii) change in outcomes measures from baseline for SM and TM separately and (iii) difference in change between SM and TM. (i) was to establish whether measures at baseline differed between the two treatment orders (SM first

or TM first). If no difference occurred, then this would be an additional justification for analysing change from baseline for individual treatment orders. (ii) and (iii) were to establish for a differential effect of treatment depending on treatment order. The results were used to decide whether subsequent analysis over the two combined treatment orders was valid or whether subsequent analysis would have to be achieved separately for each treatment order. Related t-tests were then conducted to test for change from baseline after each of the two treatments on outcome measures and for a difference of change between the two treatments. AD-ACL data after TM from one participant were missing. To avoid introducing bias, we did not replace the missing data with estimates.

Qualitative content analysis was based on a summative approach, which goes further than just counting words, but also incorporates the interpretation of underlying meaning of the words (Hsieh & Shannon, 2005). Thematic construct analysis (Dismore at al.,2016) was used to explore the social constructions and experiences from all three interviews and diaries using a biopsychosocialphysics model of complementary therapy (Van Wersch et al., 2009) to frame data analysis. Biopsychosocialphysics model (van Wersch et al., 2009) is an extension of Engel's (1977) Biopsychosocial Model to include physics in a multidimensional understanding of health and wellbeing as opposed to the one-dimensional biomedical model, especially important in the understanding of energy therapies. Commonalities in data were identified, working from a critical perspective for which researchers remained as faithful as possible to participants' own accounts, while on the other hand looking for discourses from a narrative or anecdotal perspective

in which deductive expressions were sought that were in line with the assumed massage benefits).

Each interview transcript was read and re-read separately by two coders (to address potential bias, neither of whom had no qualification, experience or training in the delivery of massage and neither of whom were involved with the choice of massage type applied in this study) to ensure familiarisation with the data, following which, coding began. Interesting aspects were identified through written notes, which formed the basis of repeated patterns. Once codes were established, they were compared and agreed across coders and sorted into potential themes with the relevant coded data extracts. Finally, quotes were reviewed, and refined and organised into the final themes.

Thematic analysis was carried out, blind to the participants' names and details, on the diaries by two coder using the method of Krippendorff (2004). One of the coders had no qualification, experience or training in the delivery of massage and was not involved with the choice of massage types investigated in this study.

Results

Internal-consistency reliability was good for most subscales of the AD ACL, with Cronbach's alpha > 0.70. The exceptions were calmness (alpha = 0.53 after SM; 0.60 at baseline) and tiredness (alpha = 0.67 after TM). With one item removed from these subscales (placid for calmness; wakefulness [reversed] for tiredness), reliability became good (0.75 for calmness after TM; 0.73 for tiredness at baseline) or acceptable (0.61 for calmness after SM). However, irrespective of whether these two items were included, correlations between subscales with and without

items removed were exceedingly high (0.94). Therefore, subscale total scores were calculated from all five items per subscale (Energy, Tiredness, Tension and Calmness); by summing subscales, scale total scores were calculated for desirable arousal (Energy + Tiredness reversed + Tension reversed + Calmness) and active arousal (Energy + Tiredness reversed + Tension + Calmness reversed). Subscale and scale scores were used in subsequent analysis.

Baseline scores. Descriptive statistics (See Table 1, b; Table 1, c) indicated that mean baseline scores were similar between the two treatment orders. In support of this observation, magnitude-based inference showed that there were no clear differences between the two treatment orders (See Supplementary Materials A, Tab 1 unrelated *t*-test dBaseline).

Place Table 1 (a, b and c) here. Descriptives and effect size of outcome measures

Change from baseline after treatment. Descriptive statistics and effect sizes (See Table 1, a) over all data indicated moderate-to-large improvements (d = 0.6 to1.2; Hopkins et al., 2009) from baseline after SM on Desirable arousal, Active arousal, Energy, Tiredness (subscale). Thematic Content Analysis showed that although both TM and SM showed improvements in sleep, with mental and physical relaxation and destressing effects, twice the number of participants receiving SM reported these beneficial effects than those receiving TM.

The results from content analysis at CO show that TM revealed experiences related to more physical energy and body awareness, such as: 'Assists physical

and emotional/ mental wellbeing/holistic' (n = 8; 80%); 'Good for energising/ motivating' (n = 4, 40%); 'encouraged to think about body/posture' (n = 4, 40%). By contrast, SM demonstrated a relaxing and calming effect which was experienced by all participants receiving SM: 'Enables relaxation/ stress reducing/ very calming' (n = 10, 100%). Benefits were also experienced in a musculoskeletal capacity: "Valuable for physical aches and pains" (n = 6, 60%) (See Figure 1)

Place Figure 1 here. Quantitative content analysis.

Thematic construct analysis revealed discourse that was categorised in eight themes. The first following four were found in both Swedish and TM: 'Improved energy'; 'Improved sleep'; 'Relaxing and destressing'; and 'Relief of muscular tension'. The latter four were only found in TM results: 'Awakening/rejuvenating'; 'Promoting motivation to engage with physical activity'; 'improved Posture/flexibility'; and, 'Life changing/psychological stimulating/positivity' (See Figure 2 and Figure 3):

Place Figure 2 here. Themes of beneficial effects for Thai and SM.

Place Figure 3 here. Themes for beneficial effects of TM only.

Nine participants cited TM as improving energy or being energising: "I felt much more energised following my treatment"). By contrast, five participants commented on SM as improving energy, with two reporting the opposite effect of

lethargy: “Relaxing, sleep inducing, but not invigorating. Felt really lethargic” 49 (5:57). (Throughout this study, these numbers represent the Diary Thematic analysis code number (participant number: diary line number) following a direct quote taken from participant diaries).

More detailed quantitative analysis indicated a small-to-moderate improvement from baseline (d = 0.2 to 0.6; Hopkins et al., 2009) following Swedish message, but a large improvement after TM when SM came before TM (Table 1, b). Moreover, there was a large improvement after both SM and after TM when TM came before SM (See Table 1, c). These results are indicative of a specific carry-over effect: a large improvement after TM was maintained after subsequent SM. The results of magnitude-based inference (See Supplementary Materials A, Tab 2 unrelated t-test dSbdTb) provide statistical evidence for this carry-over effect: a large improvement after TM was maintained after subsequent SM. Specifically, the results show clear differences between the two treatment orders on change from baseline after SM for desirable arousal, active arousal, energy and pain in favour of the order with TM first. Because of the specific carry-over effect, subsequent magnitude-based inference of change after SM was conducted on only the treatment order with SM first. However, the results show no clear differences between the two treatment orders on change from baseline after TM for any of the measures. Therefore, magnitude-based inference of change after TM was conducted on the whole data set (the combined two treatment orders). These findings were supported by the results of the thematic construct analysis. Participants found that TM increased energy and addressed pain levels, with the effects being *long-lasting*: “The sessions set me up for the week” (33a, 5:17) “I felt

that the Thai therapy had an incremental improvement in my energy" (19, 2:39); "My pain levels have reduced immensely and my energy have increased tenfold 16:38) Content analysis also revealed that in response to SM, from baseline to crossover and final interview, participants experienced deep relaxation, reduction in tiredness, de-stressing, mentally relaxing and an alleviation of muscular aches and pains. TM, over the same time periods showed invigoration, energising, reduction in tiredness, motivating, improved mental clarity and focus, increase in physical body awareness. At crossover 90% of participants reported SM as exceeded/surpassed expectations, at final interview 50% of participants reported SM as exceeding or surpassing expectations. At crossover 60% of participants reported TM as exceeded/surpassed expectations, with 67% reporting TM as exceeding or surpassing expectations. This indicates that SM exceeds expectations to a greater degree than TM; indications are that TM has a longer-lasting effect (See Figure 1).

The results for SM (See Supplementary Materials A, Tab 4 related *t*-test, and Figure 4, Panel 1) showed that the moderate change in tiredness (subscale) was likely negative (reduction), the moderate-to-large change in tiredness (single-item scale) was likely negative (reduction), the small change in pain was likely positive (increase in pain) and the small change in desirable arousal were possibly positive.

Place Figure 4 here. Comparisons of mean scores on outcome measures between conditions.

Content and Thematic analysis support these findings. At CO Content Analysis results found SM n = 10 (100%) experienced improved relaxation, calmness and reduced stress. Results of Thematic Analysis showed n = 9 participants experienced an improvement in sleep or sleep inducing effects.

The results for TM on the whole data set (See Supplementary Materials A, Tab 4 related *t*-test, and Figure 4, Panel 2) show that the large changes in desirable arousal and energy were most likely positive, the large changes in tiredness (subscale) and tiredness (single-item scale) were most likely negative (reduction), the large change in active arousal was likely positive and the moderate change in tension was likely negative (reduction). The same pattern of results occurred for TM when only the data for the treatment order SM first were analysed (See Supplementary Materials A, Tab 5 related *t*-test [additional]).

In the content analysis of the final interviews desirable arousal was demonstrated: n = 8 (89%) cited TM as Energising/ awakening/ invigorating/ promotes wellness, and n = 5 (56%) found they Slept better/ relaxing/calming. The results of thematic content analysis established active arousal in that: “TM, though very relaxing, seemed to stimulate (mind and body) when I felt fatigued” (21, 2:42,43; “I felt much more energised following my treatment. Slept quite well this week and felt more mentally awake” (1, 1:7,8,9)

Difference in change from baseline between treatments. Descriptive statistics and effect sizes (See Table 1, a) over all data indicate a small or moderate difference

in the change from baseline between SM and TM on the outcome measures. However, moderate or large differences on desirable arousal, active arousal, energy and tiredness (subscale) when SM came first (See Table 1, b), but more detailed analysis indicates no or a small difference on most measures when TM came first (See Table 1, c). These results are again indicative of a specific carry-over effect, where a large improvement after TM is maintained after subsequent SM.

The results of magnitude-based inference (See Supplementary Materials A, Tab 3 unrelated t-test 3 unrelated t-test dSbTb) provide further statistical evidence for this carry-over effect. Specifically, the two treatments were compared on change from baseline. Clear differences between the two treatment orders were found on this comparison for desirable arousal, active arousal, energy, tiredness (subscale) and pain, with bigger differences when SM came first. Because of this carry-over effect, subsequent magnitude-based inference of the comparison between the treatments on change from baseline was conducted only for the treatment order with SM first.

Regarding the difference in change from baseline for TM minus the change for SM, the results (see Supplementary Materials A, Tab 4 related *t*-test; Supplementary Materials B, Figure SM1 and SM2, Panel 3; Figure 4, Panel 3; Table 2, Panel 3) show that the large differences were very likely positive for desirable arousal and energy, the moderate difference was likely positive for active arousal, the moderate difference was likely negative (TM lower) for tiredness (subscale) and the small difference was possibly positive for calmness.

Place Table 2 here. Magnitude-based inference on outcome measures

Thematic construct analysis results indicated TM showing greater improvement in energy for participants than SM, which was cited as relaxing: “I felt that the Thai therapy had an incremental improvement in my energy level which I have to say I am not sure I am feeling now” (whilst receiving SM) (2: 39-40); “Overall I feel I prefer the Thai for the energy and poise it seems to give me. The Swedish is much more relaxing-to-the-point-of-sleepy” (6: 140-141); “I don’t have the same feeling of alignment that I experienced after Thai. “My buzz has gone but I feel relaxed” (after SM). “With Thai I felt buzzed, relaxed and centred all at the same time” (5: 47-49). TM and SM both show benefits for relief of muscular tension: “TM again greatly beneficial and reaching all manner of muscles that rarely get exercised! Great stuff. Feeling quite energised and supple” (7: 22-24); ‘Release of muscular pain and stiffness (SM) (4: 11-12). SM is again shown to have relaxing effects: “The S massage very relaxing, the T massage very awakening. I slept well, the massage definitely helped. It relaxed but woke me up at the same point” (9:24-25).

Summary of results. With SM, clear moderate or small changes from baseline were found on four out of eight of the outcome measures (Figure 4, Panel 1). With TM, clear large or moderate changes were found on six out of eight outcome measures (See Figure 4, Panel 2). Finally, when changes were compared between the two massage types, clear large, moderate or small differences in change from baseline were found in favour of TM (See Figure 4, Panel 3).

Thematic construct analysis showed that TM improved energy in double the participants of SM, and a relief of muscular tension was found in half of those receiving TM compared to a quarter of SM recipients. Both content analysis and thematic analysis showed that SM was more effective than TM for relaxing and destressing effects. TM showed unique categories which were not seen in SM: awakening/rejuvenating, promoting desire to engage in physical activity, improved posture and flexibility, life changing/psychologically stimulating and positivity effects, which contribute to the holistic effect of TM. Eighteen participants (95%) found that their initial reason for being involved in the study was addressed i.e. fatigue or depleted energy. Furthermore, 18 participants (95%) felt it was valuable having weekly sessions.

Discussion

The results of both TM and SM showed improvement in sleep, relaxing and destressing and relief of muscle aches and pains, with SM being more effective than TM for relaxation and stress. This has been noted in findings of other research into massage therapy (MT) – 'Massage therapy consists of the application of massage and non-hands-on components, including health promotion and education messages, for self-care and health maintenance' (Kennedy et al, 2016). Smith et al. (1999), in their study on MT for hospitalised patients, cite improved quality of life results of over 90% for relaxation and sense of wellbeing, along with positive results for reduce muscle tension, psychological support and enhanced sleep. In their meta-analysis, Crawford et al, 2016 found that MT effectively alleviated pain and should be strongly recommended as a

treatment rather than no treatment. This study also found MT beneficial for health-related quality of life and anxiety (Crawford et al, 2016).

The results presented in SM1 are a graphical representation of the numerical results presented in the spreadsheet within Supplementary Materials A and B. We have chosen this representation as a condensed way of conveying the results of magnitude-based inference and to reduce the volume of results (presented in the Supplementary Materials) that would otherwise have to be presented in the paper. These results are essential because they present the inferential statistical results from which conclusions are drawn about the effect of the treatments. The caption to SM1 indicates that the line segments represent the chances of the result being positive, the chances of the result being negligible and the chances of the result being negative.

Improved sleep was found in the results of in both TM and SM, although twice the number of participants cited SM as improving sleep and/or sleep inducing. SM promoted relaxation and alleviation of stress in 100% of participants (at crossover, 50% at final interviews), surpassing their expectations: “Very relaxing. Good to have time to think and know my body is being distressed. Felt very relaxed afterwards” (160, 10: 4-5).

Other studies also cite SM as reducing symptoms of stress and anxiety, insomnia and joint/muscle pain (Bost & Wallis 2006; Cowen et al. 2005).

A clear large, moderate or small change from baseline was found in favour of TM, with clear differences in effect from SM. Although some outcomes were similar,

TM treatments also resulted in more invigorating and energising response, improvement in mental focus, improved flexibility/posture and psychological stimulation outcomes. TM also had longer-lasting effects, with a contribution to carry-over effects when preceding or following SM. A secondary outcome showed three participants citing TM as either life-changing or stimulating positivity (see Figure 3 and Supplementary Materials B: 1608 Diary Codes & Themes): "I suspect we're dealing with parts of my musculature that have been tense for years without any chance of being into any form of relaxation. There's something amazing happening." The literature on TM supports these findings: Keeratitanout et al. (2015) cite TM as increasing flexibility and decreasing muscle tension. One of the aims of Thai general massage is to restore energetic balance by helping to remove blockages and bring balance to the body, mind and spirit. TM induces relaxation and stress relief, although in some recipients this effect may exceed the here-and-now presenting symptoms to actually access and release longer term emotional holding patterns and blockages (Banpasirichote 1989; Chaithaouthi & Muangsiri 2007).

Conclusion

This study found that six weekly massages (three of TM and three of SM) addressed fatigue or low energy by releasing stress, promoting relaxation and relieving muscular aches and pains. A weekly massage allowed time for the participant to relax and recover from stressful life routines and provided physical and mental benefits - a holistic (mind/body) effect - enabling better coping with adverse life events and subsequent stress. TM actively addressed fatigue by

inducing an energising, rejuvenating and mentally stimulating/motivating effect; SM addressed fatigue through alleviation of stress and promotion of relaxation.

As the benefits of TM and SM are both biological and psychological, it is recommended that further research into massage therapy considers the psychosocialphysics perspective as important as the biomedical model. With results showing energising effects for TM, other recommendations would include an exploratory randomised trial to further consider this outcome without the confounding factor of SM in the crossover trial.

Limitations

This study was limited by the small sample size of n = 20. This limitation suggests that the results should be interpreted as hypothesis-generating with a larger confirmatory study recommended. Participants were randomized after all baseline data had been collected and before treatment commenced. Only the clinician (masseuse) was aware of which participant was allocated to which arm and what the codes of the randomisation sequence represented. In studies with interventions of this type it is impossible for the clinician delivering the intervention (massages) to be blind. The collection of interview data and conducting the data analysis were all undertaken blind.

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Supplementary Materials A: spreadsheet with magnitude-based inferences

Supplementary Materials B: graphical representation of magnitude-based inferences, and diary codes and themes

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CAPTIONS TO ILLUSTRATIONS

Figure 1. Quantitative content analysis.

Figure 2. Themes of beneficial effects for Thai and Swedish Massage

Figure 3. Themes for beneficial effects of TM only

Figure 4. Comparisons of mean scores on outcome measures between conditions. All values are scaled as a percentage.

Table 1. Descriptives and effect sizes of outcome measures

Table 2. Magnitude-based inference on outcome measures

Tables

Table 1
Descriptives and effect size of outcome measures

a. All data

Measure	Baseline		Swedish massage		Thai massage		Sw - Bl	Th - Bl	(Th - Bl) - (Sw - Bl)
	M	*SD*	*M*	*SD*	*M*	*SD*	*d*	*d*	*d*
Desirable arousal	44.98	8.89	51.05	11.24	57.05	8.04	0.60	1.38	0.47
Active arousal	44.31	8.35	49.75	8.12	52.32	6.02	0.66	1.04	0.24
Energy	8.00	2.82	9.64	3.12	11.75	2.31	0.55	1.40	0.53
Tiredness	12.28	2.73	9.32	3.45	8.00	2.73	-0.95	-1.52	-0.27
Tension	8.81	3.29	7.80	3.60	7.03	3.08	-0.29	-0.58	-0.16
Calmness	9.08	2.41	8.32	2.30	8.93	2.89	-0.32	-0.05	0.15
Pain[a]	2.32	2.39	2.36	1.99	2.64	1.94	0.02	0.15	0.12
Tiredness[a]	6.84	1.71	4.93	2.28	4.56	2.70	-0.95	-1.01	-0.15

[a]Single-item scale.

b. Swedish massage first

Measure	Baseline		Swedish massage		Thai massage		Sw - Bl	Th - Bl	(Th - Bl) - (Sw - Bl)
	M	*SD*	*M*	*SD*	*M*	*SD*	*d*	*d*	*d*
Desirable arousal	45.70	10.19	48.30	13.20	59.44	5.98	0.22	1.53	0.97
Active arousal	43.90	8.61	46.10	7.69	51.89	3.95	0.27	1.06	0.64
Energy	8.00	3.06	7.92	3.49	11.91	2.02	-0.02	1.38	1.31
Tiredness	12.16	2.77	10.16	3.97	7.38	2.68	-0.58	-1.65	-0.77
Tension	8.24	3.50	7.36	3.57	6.40	3.35	-0.25	-0.56	-0.11
Calmness	8.96	2.61	8.24	2.53	9.42	3.07	-0.28	0.18	0.25
Pain[a]	2.08	2.49	2.95	2.68	2.48	2.23	0.34	0.17	-0.22
Tiredness[a]	6.94	1.82	5.14	2.38	4.47	3.09	-0.85	-0.97	-0.27

[a]Single-item scale.

c. Thai massage first

Measure	Baseline		Swedish massage		Thai massage		Sw - Bl	Th - Bl	(Th - Bl) - (Sw - Bl)
	M	*SD*	*M*	*SD*	*M*	*SD*	*d*	*d*	*d*
Desirable arousal	44.27	7.87	53.80	8.69	54.90	9.31	1.15	1.23	0.10
Active arousal	44.73	8.52	53.40	7.09	52.70	7.63	1.11	0.99	-0.07
Energy	8.00	2.72	11.36	1.35	11.60	2.65	1.57	1.34	0.06
Tiredness	12.40	2.83	8.48	2.78	8.56	2.80	-1.40	-1.36	0.02
Tension	9.38	3.15	8.24	3.77	7.60	2.88	-0.33	-0.59	-0.20
Calmness	9.20	2.33	8.40	2.17	8.48	2.80	-0.35	-0.28	0.04
Pain[a]	2.56	2.40	1.77	0.61	2.80	1.70	-0.45	0.12	0.41
Tiredness[a]	6.74	1.70	4.71	2.27	4.65	2.41	-1.01	-1.00	-0.02

[a]Single-item scale.

Table 2

Magnitude-based inference on outcome measures

Swedish massage - baseline (order: Swedish massage first)

	Chances that the true value of the effect statistic is …						Odds ratio benefit/harm	1/(Odds ratio benefit/harm)
	beneficial or substantially +ive		negligible or trivial		harmful or substantially -ive			
1 Desirable arousal.	53.9 %	possibly	42.6 %	possibly	3.6 %	very unlikely	31.28	0.03
2 Active arousal.	57.3 %	possibly	31.0 %	possibly	11.7 %	unlikely	10.07	0.10
3 Energy.	18.9 %	unlikely	56.7 %	possibly	24.3 %	unlikely	0.73	1.38
4 Tiredness.	94.6 %	likely	5.1 %	unlikely	0.3 %	most unlikely	6455.99	0.00
5 Tension.	56.5 %	possibly	35.7 %	possibly	7.9 %	unlikely	15.20	0.07
6 Calmness.	9.7 %	unlikely	31.3 %	possibly	59.0 %	possibly	0.07	13.36
7 Pain (single-item scale).	0.8 %	very unlikely	22.9 %	unlikely	76.3 %	likely	0.00	386.25
8 Tiredness (single-item scale).	93.3 %	likely	5.4 %	unlikely	1.3 %	very unlikely	1066.44	0.00

(Table 2, continued)
Thai massage - baseline (all data)

	Chances that the true value of the effect statistic is …									
	beneficial or substantially +ive		negligible or trivial		harmful or substantially -ive		Odds ratio benefit/harm	1/(Odds ratio benefit/harm)
1 Desirable arousal.	99.9 %	most likely	0.0 %	most unlikely	0.0 %	most unlikely	66358933.67	0.00
2 Active arousal.	99.1 %	very likely	0.8 %	very unlikely	0.1 %	most unlikely	182020.33	0.00
3 Energy.	99.9 %	most likely	0.1 %	most unlikely	0.0 %	most unlikely	31724567.31	0.00
4 Tiredness.	100.0 %	most likely	0.0 %	most unlikely	0.0 %	most unlikely	85759150.11	0.00
5 Tension.	91.7 %	likely	7.9 %	unlikely	0.4 %	most unlikely	2647.84	0.00
6 Calmness.	15.4 %	unlikely	58.4 %	possibly	26.2 %	possibly	0.51	1.95
7 Pain (single-item scale).	11.4 %	unlikely	46.1 %	possibly	42.5 %	possibly	0.17	5.74
8 Tiredness (single-item scale).	99.8 %	most likely	0.2 %	most unlikely	0.0 %	most unlikely	7519941.81	0.00

(Table 2, continued [2])
(Thai massage - baseline) - (Swedish massage - baseline) (order: Swedish massage first)

	Chances that the true value of the effect statistic is …									
	beneficial or substantially +ive		negligible or trivial		harmful or substantially -ive		Odds ratio benefit/harm	1/(Odds ratio benefit/harm)
1 Desirable arousal.	95.9 %	very likely	3.3 %	very unlikely	0.8 %	very unlikely	2728.20	0.00
2 Active arousal.	92.9 %	likely	6.4 %	unlikely	0.7 %	very unlikely	1796.65	0.00
3 Energy.	98.0 %	very likely	1.5 %	very unlikely	0.5 %	very unlikely	9925.67	0.00
4 Tiredness.	88.1 %	likely	8.8 %	unlikely	3.1 %	very unlikely	230.95	0.00
5 Tension.	39.8 %	possibly	39.7 %	possibly	20.5 %	unlikely	2.57	0.39
6 Calmness.	57.7 %	possibly	37.7 %	possibly	4.6 %	very unlikely	28.30	0.04
7 Pain (single-item scale).	51.8 %	possibly	31.4 %	possibly	16.9 %	unlikely	5.29	0.19
8 Tiredness (single-item scale).	17.4 %	unlikely	27.0 %	possibly	55.6 %	possibly	0.17	5.96

FIGURES

Crossover Interviews (N = 20: TM n = 10, SM n = 10)	Final Interviews (N = 19: TM n = 9, SM n = 10)

Current opinion of TM?	Physical benefits	General	3	30%	Current opinion of TM?	Physically rather than mentally/ emotionally beneficial/ promotes physical wellbeing/ aligning/ increases physical awareness		6	67%*
		Valuable for pain	3	30%		Promotes mental clarity/ focus		5	56%*
		Valuable for tiredness/ lethargy	1	10%		Improved physical wellbeing leads to improved psychological wellbeing		3	33%*
	TM convert/ amazing		3	30%		Invigorating/ feel springy/ energising		4	44%*
	Assists physical and emotional/ mental wellbeing/ Holistic		8	80%		Promotes general wellbeing/ Holistic		4	44%*
	Prompted awareness of body/ posture		4	40%		Would be beneficial prophylactically		1	11%*
	Encouraged to be more health/ wellbeing conscious		1	10%		Torture		1	11%*
	Good for energising/ motivating		4	40%					
	Disappointing/ not beneficial		1	10%					
Current opinion of SM?	Valuable for tiredness/ sleep inducing		4	40%	Current opinion of SM?	Promotes deep long lasting relaxation		3	30%
	Valuable for physical aches and pains		6	60%		Enables coping with stress/calming		3	30%
	Enables relaxation/ stress reducing/ very calming		10	100%		Good for physical aches and pains/ promotes physical wellbeing		2	20%
	Makes you feel good		2	20%		Mentally relaxing		1	10%
	Psychological benefits outweigh physiological/ physical benefits		3	30%		Holistic/ improves physical and mental/ emotional wellbeing		2	20%
	Holistic benefits/ effects		5	50%		Pleasurable but not therapeutic		1	10%
Expectations	TM	Failed to meet	1	10%	Expectations	TM	Failed to meet	1	11%*
		Met	1	10%			Met	0	0%
		Exceeded/ surpassed	6	60%			Exceeded/ surpassed	6	67%*
		Did not have any at baseline	2	20%			Did not have any at baseline	2	22%*
	SM	Failed to meet	0	0%		SM	Failed to meet	3 (all 2nd)	30%
		Met	1 emotionally	10%			Met	2	20%
		Exceeded/ surpassed	8&1physically	90%			Exceeded/ surpassed	5	50%
Final Interviews (N = 19: TM n = 9, SM n = 10) Was your initial reason for being involved in the study addressed?				Yes				18	95%*
				No				1	5%*

Figure 1. Quantitative content analysis.

Theme 1 – **Improved energy**

TM – improved energy/energising
"I prefer the Thai for the energy and poise it gives me" 77&78 (6:140)
"Think the Thai really helps. Full of energy today" 167 (10:74)
"I felt much more energised following my treatment" 1 (1:8)
(9 participants - 6 TM first/3 SM first)

SM – Improved energy
"Felt relaxed and energised at the same time. Excellent" 162(10:17)
"Relaxing, sleep inducing, but not invigorating. Felt really lethargic" 49(5:57)
(5 participants - 2 Thai first/3 Swedish first) although 2 other participants found Swedish to promote lethargy (evens TM/SM first)

Theme 2 – **Improved sleep**

TM – Improved/better quality sleep
"I am sleeping better" 158 (9:27)
"Up early again but I think even though I am getting less sleep I am sleeping Better?" 38a(5:26)
(4 participants – evens TM/SM first)

SM – improved sleep/sleep inducing
"Better sleep. Slept very well, in fact nearly slept in!" 9(1:22,25)
"Sleeping better" 107 (15:5)
"Left me a lot more sleepy than the Thai" 73(6:105)
(9 participants – evens TM/SM first)

Theme 3 – **Relaxing and destressing**

TM – Relaxing/distressing
"At night felt tired at nighttime (11pm) which is nice but unusual!" 88 (4:2-3)
"Calm, rested, relief, relaxed" 93, 96 & 98 (15: 1-4)
(4 participants – 3 TM first/1 SM first)

SM - Relaxing & Destressing/'me' time/improved ability to cope
"It was so relaxing. I felt warm, comfortable and deeply relaxed during it" 121(4:2)
"I think that I deal with people and situations better having that extra time to relax" 153(9:15-16)
"Very relaxing. Good to have time to think and know my body is being destressed. Felt very relaxed afterwards" 160(10: 4-5)
"Relaxing and can now 'zone out', keep my eyes closed and drift away" 187 (13:7)
"Felt wonderfully relaxed and destressed mentally and physically" 4 (1:15)
(8 participants – evens TM/SM first)

Theme 4 – **Relief of muscular tension (aches, pains and stiffness)**

TM – Relief of muscular tension
"I am aware that some of my long-term aches and pains are not making their presence felt anymore …." 118 (3: 33-34)
"Thai massage again greatly beneficial and reaching all manner of muscles that rarely get exercised. Great stuff" 144 (7:22-23)
"Pain levels have reduced immensely" 208 (16:37)
"Enjoyed Thai and was very useful for hip soreness" 164 (10:60)
(10 participants – evens TM/SM first)

SM – Relief of muscular tension
"Feels as though I am moving in ways I didn't before the massages. It's Felt good" 133 (4: 36-37)
"Feels all stretched and loose but in a good way" 129 (4: 24-25)
"I don't get the same relief from aches and pains" 51a (5:57)
(7 participants – 5 SM first/2 TM first) although 2 participants
Found Swedish did not address aches & pains (evens TM/SM first)

Figure 2. Themes of beneficial effects for TM and SM

Theme 5 – Awakening/rejuvenating

(6 participants – 4 TM first/2 SM first)

"I felt more refreshed than I had in a long time" 203 (16: 24)

"Thai massage very awakening" 155 (9:24)

Theme 6 - Promotes motivation to engage with physical activity

(7 participants – approx. evens TM/SM first)

"I was up with the larks and out the door for a run, though feel positive For it" 31 (5: 12-13)

"No big slumps and exercised a lot" 89a (14: 33)

Theme 7 - Improved posture/flexibility

(5 participants – mostly TM first)

"Flexible limbs, flexibility" 100 (15: 4)

"Improves posture, feel taller" 14 (2: 16)

"My body is more aligned, like yoga but better" 32 (5:17) "I still feel strangely 'straight' it's a nice feeling" 36 (5: 21)

Theme 8 – Life changing/psychological stimulating/positivity

(6 participants – evens TM/SM first)

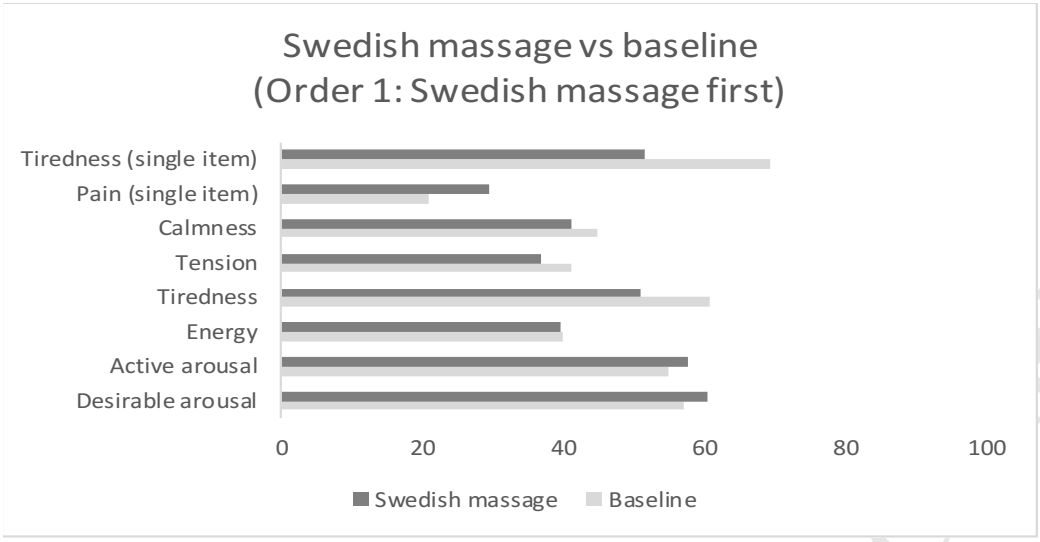
"Buzzed, relaxed and centred all at the same time" 47 (5: 48)

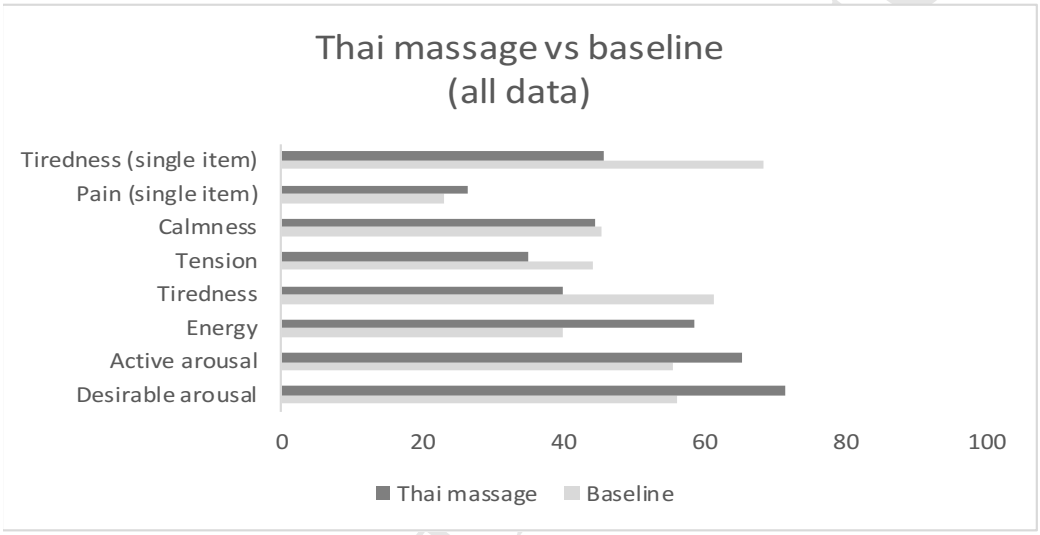
"I cannot explain or describe the difference Thai massages have made to My life. I feel so much better both physically and psychologically" 207 (16:36)

"I find I am more conscious of what I eat and drink. I am drinking water for the first time in years. I think that I am finding the therapy to be almost a cleansing experience and that I don't want to spoil things with bad food" 13 (2: 16, 17 & 18)

"For 4 days afterwards, I was aware of being much more up and positive, even when things got hard" 113 (3: 16-17)

Figure 3. Themes for beneficial effects of TM only





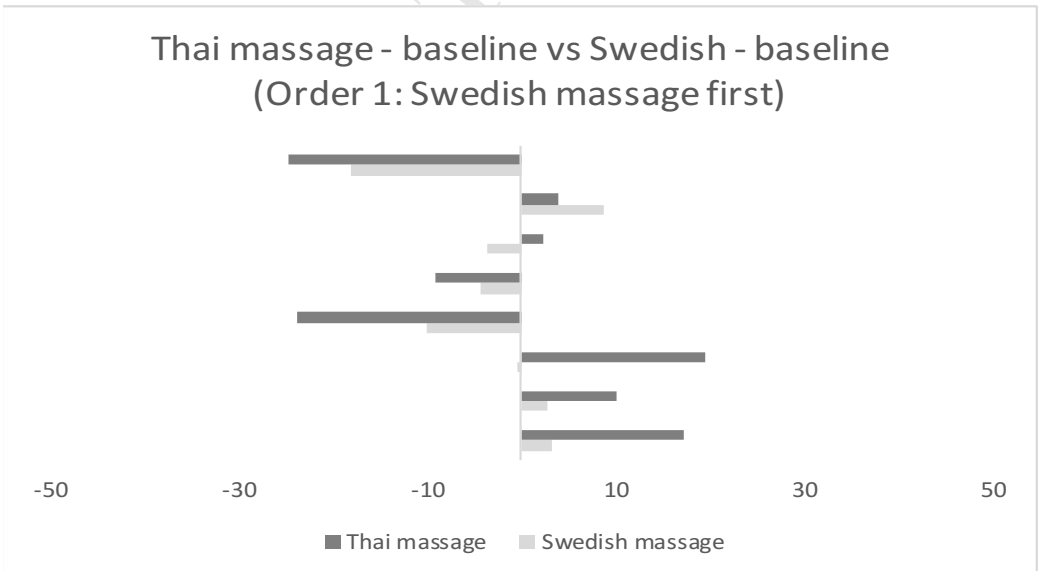


Figure 4. Comparisons of mean scores on outcome measures between conditions. All values are scaled as a percentage.

Supplementary material'

SUPPLEMENTARY MATERIAL A

SUPPLEMENTARY MATERIAL B

These can be found online here (typesetters to update line)